

The Examiner acknowledges Applicants' claim for foreign priority under 35 U.S.C. § 119. The Examiner has not indicated that the Japanese Office Action dated April 17, 2001, was considered by initialing the reference listed on the PTO 1449 form attached to the IDS filed on July 19, 2001. Applicants respectfully request the Examiner to consider the Japanese Office Action and initial by the reference. The Examiner has objected to the title of the invention as being non-descriptive. Applicants have amended the title to overcome the objection.

Claims 1-12 are pending in the application. Claims 1-3 and 7-9 are rejected under 35 U.S.C. § 102(b) as being anticipated by Furukawa et al. (U.S. Patent No. 5,463,618). Further, claims 4-5 and 10-11 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Furukawa in view of Rahim et al. ("Signal Conditioning Techniques for Robust Speech Recognition," 1996). Still further, claims 6 and 12 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Rahim.

35 U.S.C. § 102(B) REJECTION

"A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." MPEP 2131. Claims 1-3 and 7-9 are rejected under 35 U.S.C. § 102(b) as being anticipated by Furukawa. However, Furukawa does not disclose each and every element of these claims.

Regarding claim 1, Furukawa does not disclose a speech processing apparatus comprising "decision means for checking, *in each frame*, whether or not a voice is included in the microphone input signal, *by using time domain information and frequency domain information of said acoustic echo-canceled signal*." The Examiner

asserts that Furukawa discloses this element, citing to col. 7, lines 40-55, which discloses a voice detector 8. Claim 1 recites that time domain information and frequency domain information of an acoustic echo-canceled signal is used to check, in each frame, whether a voice is included in a microphone input signal. Furukawa does not disclose that voice detection is based on time domain information and frequency domain information of an acoustic echo-canceled signal. Additionally, Furukawa does not disclose that voice detection is carried out in each frame.

Referring to Fig. 3 of Furukawa, a signal, x, is input to the voice detector 8. Therefore, voice detection in Furukawa is based on the signal, x. However, Furukawa does not disclose that the signal, x, is an acoustic echo-canceled signal, as recited in claim 1. Furukawa merely discloses that "x is a reference input signal." See, column 6, line 42. Even assuming the signal, x, is an acoustic echo-canceled signal, Furukawa does not disclose that voice detection is based on *time domain information* and *frequency domain information* of the signal, x.

Further, regarding claim 1, Furukawa does not disclose a speech processing apparatus comprising "control means for, in a frame for which the result of decision made by said decision means is negative, storing in said storage means the current impulse response held by said supply means and, in a frame for which the result of decision is positive, retrieving one of the impulse responses stored in said storage means and supplying it to said supply means." That is, Furukawa does not disclose (1) storing in a storage means a current impulse response held by a supply means when a voice is not included in a microphone input signal and (2) retrieving an impulse

response stored in a storage means and supplying it to a supply means when a voice is included in a microphone input signal.

The Examiner contends that Furukawa discloses these elements at column 7, lines 63 through column 8, line 53. However, Furukawa discloses:

[T]he first threshold Th1 is gradually increased so as not to exceed the first ratio R1 when the voice detector 8 has determined that far-end speech is present Further, the threshold controller 41 holds the previous value of the first threshold Th1 when it has been determined that no speech is present."

Column 7, lines 58 through column 8, line 1 (emphasis added). Thus, Furukawa discloses *increasing a threshold, Th1*, when far-end speech is present and *holding the threshold, Th1*, when no speech is present. More specifically, Furukawa discloses *increasing or holding a threshold value*. Furukawa does not disclose *storing or retrieving* an impulse response as recited in claim 1.

Further, although Furukawa discloses that "an adaptation controller 42 determines to execute adaptation of the first adaptive filter 1 when the voice detector 8 has determined that speech is present," Furukawa does not disclose (1) storing in a storage means a current impulse response held by a supply means when a voice is not included in a microphone input signal and (2) retrieving an impulse response stored in a storage means and supplying it to a supply means when a voice is included in a microphone input signal, as recited in claim 1.

For the above reason, claim 1 is patentable over Furukawa. Claims 2-5 are at least patentable based on their dependency from claim 1. Claim 7, a method claim, is patentable over Furukawa for the same reasons stated above. Claims 8-11 are at least patentable based on their dependency from claim 7.

If the Examiner continues to maintain that the above elements are disclosed in Furukawa, Applicants respectfully request the Examiner to particularly point out where these elements are disclosed so that Applicants may have the opportunity to reply completely. See 37 CFR 1.104 ("When a reference is complex . . . the particular part relied on must be designated as nearly as practicable."); MPEP 706 ("The goal of examination is to clearly articulate any rejection early in the prosecution process so that the applicant has the opportunity to provide evidence of patentability and otherwise reply completely at the earliest opportunity.").

Regarding claim 3, Furukawa does not disclose the elements recited in claim 3. More specifically, Furukawa does not disclose (1) means for determining a spectrum, (2) means for successively determining a spectrum mean, and (3) means for successively subtracting the spectrum mean from the spectrum. For these additional reasons, claim 3 is patentable over Furukawa. Claim 9, a method claim, is also patentable over Furukawa for these additional reasons. If the Examiner continues to maintain that the above elements are disclosed in Furukawa, Applicants respectfully request the Examiner to particularly point out where these elements are disclosed so that Applicants may have the opportunity to reply completely.

35 U.S.C. § 103(A) REJECTIONS

MPEP 2143.03 states that to establish a prima facie case of obviousness of a claimed invention, *all the claim limitations must be taught or suggested by the prior art*. Claims 4-5 and 10-11 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Furukawa in view of Rahim. However, Furukawa and Rahim do not disclose all the claim limitations recited in these claims.

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More specifically, regarding claim 4, neither Furukawa nor Rahim discloses (1) means for determining a spectrum, (2) means for successively determining a spectrum mean, (3) means for successively subtracting the spectrum mean from the spectrum, (4) means for determining a cepstrum from the spectrum, (5) means for determining for each talker a cepstrum mean of a speech frame and a cepstrum mean of a non-speech frame, separately, from the cepstrums obtained, and (6) means for subtracting the cepstrum mean of the speech frame of each talker from the cepstrum of the speech frame of the talker and for subtracting the cepstrum mean of the non-speech frame of each talker from the cepstrum of the non-speech frame of the talker.

Regarding elements (1) through (3), the Examiner does not particularly point out where these features are disclosed in either Furukawa or Rahim. MPEP 2142 provides, "The examiner bears the initial burden of factually supporting any prima facie conclusion of obviousness. . . . To establish a prima facie case of obviousness . . . the prior art reference (or references when combined) must teach or suggest all the claim limitations." Because the Examiner has failed to cite where these elements are disclosed in either Furukawa or Rahim, the Examiner has failed to meet the initial burden of establishing a prima facie case of obviousness. Accordingly, claim 4 is patentable over the cited references. Claim 10, a method claim, is patentable for the same reasons. If the Examiner continues to maintain that elements (1) through (3) are disclosed in either Furukawa or Rahim, Applicants respectfully request the Examiner to particularly point out where these elements are disclosed so that Applicants may have the opportunity to reply completely.

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Regarding elements (4) though (6), the Examiner contends that Rahim discloses these elements. Element (4) recites "means for determining a cepstrum from a spectrum." Rahim does not disclose this element. More specifically, Rahim discloses determining an average cepstral vector, \bar{c} , from a received cepstrum vector sequence, $\{Y = y_1, y_2, \dots, y_t, \dots, y_T\}$. The cepstrum vector sequence comprises a vector of "contaminated signals $y(t)$ " caused by degradation of a speech signal, $x(t)$, passing through a telephone channel. See, Rahim, page 107. Rahim does not disclose determining a spectrum. Because Rahim does not disclose determining a spectrum, it follows that Rahim does not disclose determining a cepstrum from a spectrum. In fact, Rahim explicitly discloses computing a cepstral vector from a vector of signal $y(t)$. For this additional reason, claims 4 and 10 are patentable over the cited references. If the Examiner continues to maintain that element (4) is disclosed in Rahim, Applicants respectfully request the Examiner to particularly point out where this element is disclosed so that Applicants may have the opportunity to reply completely.

Regarding element (5), Rahim does not disclose "means for determining for each talker a cepstrum mean of a speech frame and a cepstrum mean of a non-speech frame, separately, from the cepstrums obtained." Rahim does not distinguish between speech frames and non-speech frames. Rahim merely discloses that an average cepstral vector is computed from a received cepstrum vector sequence, *without distinguishing between speech frames and non-speech frames*. For this additional reason, claims 4 and 10 are patentable over the cited references. If the Examiner continues to maintain that element (5) is disclosed in Rahim, Applicants respectfully

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request the Examiner to particularly point out where this element is disclosed so that Applicants may have the opportunity to reply completely.

Similarly, regarding element (6), Rahim does not distinguish between speech frames and non-speech frames. Therefore, it follows that Rahim does not disclose "means for subtracting the cepstrum mean of *the speech frame* of each talker from the cepstrum of *the speech frame* of the talker and for subtracting the cepstrum mean of *the non-speech frame* of each talker from the cepstrum of *the non-speech frame* of the talker," as recited in claim 4. For this additional reason, claims 4 and 10 are patentable over the cited references. If the Examiner continues to maintain that element (6) is disclosed in Rahim, Applicants respectfully request the Examiner to particularly point out where this element is disclosed so that Applicants may have the opportunity to reply completely.

Claims 5, 6, 11, and 12 recite similar elements recited in claims 4 and 10. For the reasons stated above, these claims are patentable over Furukawa and Rahim.

Further, regarding claims 6 and 12, the Examiner admits that Rahim does not disclose "means for subtracting the cepstrum mean of the non-speech frame of each talker from the cepstrum of the non-speech frame of the talker," as recited in claim 6. MPEP 2143.01 states that obviousness can only be established by combining or modifying the teachings of the prior art *where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art*. Pursuant to MPEP 2143.01, if neither Rahim nor the knowledge generally available to one of ordinary skill in the art teaches modifying the reference to produce the claimed invention, then obviousness

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can not be established. Still further, obviousness requires a reasonable expectation of success. MPEP 2143.02. Therefore, if neither Rahim nor the knowledge generally available to one of ordinary skill in the art teaches a reasonable expectation of success in modifying the reference to produce the claimed invention, then obviousness can not be established. Finally, 37 CFR § 1.104 provides that when a rejection in an application is based on facts within the personal knowledge of an Examiner, the data should be stated as specifically as possible, *and the facts must be supported*, when called for by the applicant, by an affidavit from the Examiner. Furthermore, the Examiner may only take official notice of facts outside of the record which are capable of instant and unquestionable demonstration as being "well-known" in the art and, if the Applicant traverses such an assertion, the Examiner *should cite a reference* in support of his or her position. See, MPEP 2144.03.

The Examiner merely asserts, "[I]t would have been obvious . . . to use a CMS algorithm on a speech cepstrum and a non-speech cepstrum to provide an accurate estimate of other sounds or noise, so as to provide more efficient signal enhancement of the input signal to the speech recognizer." The Examiner has failed to point out some teaching, suggestion, or motivation *found in either Rahim or in the knowledge generally available to one of ordinary skill in the art* to modify Rahim to include "means for subtracting the cepstrum mean of the non-speech frame of each talker from the cepstrum of the non-speech frame of the talker," as recited in claim 6. Still further, there is no teaching found in Rahim or the knowledge generally available to one of ordinary skill in the art that providing means for subtracting the cepstrum mean of the non-speech frame of each talker from the cepstrum of the non-speech frame of the talker, as

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recited in claim 6, would "provide an accurate estimate of other sounds or noise, so as to provide more efficient signal enhancement of the input signal to the speech recognizer," as the Examiner asserts. The Examiner is engaging in impermissible hindsight, merely stating that there is motivation to modify Rahim, without citing to anything in Rahim or the knowledge generally available to one of ordinary skill in the art to make such modification. MPEP 2143.01 ("The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination.").

Because neither Rahim nor the knowledge generally available to one of ordinary skill in the art teaches modifying the reference to produce the claimed invention, the Examiner has failed to meet the initial burden of establishing a prima facie case of obviousness. Further, because neither Rahim nor the knowledge generally available to one of ordinary skill in the art teaches a reasonable expectation of success in modifying the reference to produce the claimed invention, the Examiner has failed to meet the initial burden of establishing a prima facie case of obviousness. Pursuant to MPEP 2144.03, if the Examiner continues to maintain the § 103(a) rejection of claims 6 and 12 based on the current grounds, Applicants respectfully request that the Examiner provides support for his assertions. More specifically, Applicants respectfully request the Examiner to cite a reference in support of his position that "it would have been obvious . . . to use a CMS algorithm on a speech cepstrum and a non-speech cepstrum to provide an accurate estimate of other sounds or noise, so as to provide more efficient signal enhancement of the input signal to the speech recognizer."

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DUTY TO ANSWER ALL MATERIAL TRAVERSED

Applicants have raised numerous arguments above traversing the Examiner's rejections under §102 and § 103. The Examiner is respectfully reminded of the duty to answer all material traversed. See, e.g., MPEP 707.07(f).

CONCLUSION

In view of the foregoing amendments and remarks, Applicants respectfully request the reconsideration and reexamination of this application and the timely allowance of the pending claims.

Please grant any extensions of time required to enter this response and charge any additional required fees to our deposit account 06-0916.

Respectfully submitted,

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